from the sapphire substrate to a lower portion of the mesa structure and the ridge at the upper portion of the mesa structure, resulting in the scribing force being too concentrated, thus resulting in non-uniform cleavage planes. In other words, the shapes of the cleavage planes are different from chip to chip even when the chips are manufactured on the same scribing conditions. When scribing the mesa structure, by transferring the scribing force from the sapphire substrate to the mesa structure, the scribing force is concentrated on a lower corner of the mesa structure so that cracks occur at the lower corner of the mesa structure as shown in the dotted triangle of Figure 3, for example. Here the cracks are transferred to the light exiting surface. Various cracks in the rough cleavage plane result in the decreased optical output and an increased operating current.

The presently claimed invention addresses these types of problems. Specifically, as recited in claim 1, for instance, the semiconductor laser device includes a multi-semiconductor material layered mesa structure having a laser resonance layer on a substrate and cladding layers formed over and below the resonance layer. The semiconductor laser device includes rounded corners connected to the substrate, in a lower portion of the mesa structure. A current injection ridge is formed on the upper portion of the mesa structure and protrudes from the upper surface of the mesa structure. A passivation layer is formed on the mesa structure and has a contact hole exposing an upper surface of the current injection ridge. The current injection ridge is illustrated in the exemplary embodiments by reference number 151a and the rounded corners are represented by 121a.

Claim 9 is similar to claim 1, but recites that the current injection ridge is accompanied by force distribution ridges formed on an upper portion of the mesa structure, which protrude from the upper surface of the mesa structure, and which are represented by the current injection ridge 151a and the force distribution ridges 141b in Figures 5 and 6, for example.

Applicants respectfully submit that the presently claimed invention is neither anticipated nor rendered obvious by the applied art. First, it is apparent that none of the applied art appreciates the problem of the prior art identified in the present application nor does it suggest that rounded corners provide a solution to any problem. Instead, applicants respectfully submit that to the degree rounded corners are illustrated, they are illustrated merely because the draftsperson chose to illustrate the structure by a rounded line, rather than intersecting lines. Applicants' earlier point was that the drawings should not be relied upon for showing a rounded corner simply because the line is curved. There is no supporting disclosure suggesting that the rounded corner was intentional or actually apparent in the device as designed. In this regard, the Okazaki et al and Van Ruyven patents are similar in nature. For instance, the Van Ruyven patent describes the process of forming the mesa structure in column 7, lines 28-37, but there is no mention of deliberately forming a rounded structure, nor is there any suggestion of the problem identified in the present application being addressed. The Okazaki et al patent is similar in this regard in that it only mentions selective etching such as dry etching and wet etching. The Okazaki patent illustrates the corners both by intersecting lines and by curved lines, further illustrating applicants' point that the illustrations are merely draftsperson's license and not intended to reflect the actual structure. For these

reasons alone, applicants respectfully submit that the applied art does not anticipate the present invention.

However, even if one were to assume, *arguendo*, that the draftsperson's choices in illustrating the intersecting lines could be relied upon in a legal sense to support a finding that these patents disclose rounded corners, it is noted that neither the Van Ruyven nor the Okazaki et al patents disclose a current injection ridge. In this regard, the Office suggests that the Van Ruyven patent meets this recitation by the area marked with the Ø. Applicants do not understand this comment. The Ø marks that an electrical connection is made through the third electrode 19. There is no raised ridge structure, let alone a current injection ridge formed on the upper portion of the mesa structure and protruding from an upper surface of the mesa structure. This is particularly apparent insofar as contact layer 14 includes a highly doped region 14a which is described as facilitating contacting at column 7, lines 46-58. It is assumed by this disclosure that the Van Ruyven patent is discussing a current injection region rather than the current injection ridge. As disclosed in the present application, the current injection ridge limits currents that are injected into the active area in order to limit the width of a resonance area for laser oscillation of the active area as disclosed at page 2, lines 30-32 of the present application. The appearance of a current injection ridge leads to the very problems that applicants are addressing by the rounded corners and forced distribution ridges. Because they are not present in the Okazaki et al patent nor the Van Ruyven patent, these patents would not seem to suffer the same degree of problems and therefore there would be no reason to modify them to include such structures.

Applicants note the Office's rebuttal comments. With respect to the citation to MPEP §2125, as explained above, even if one were to assume that the drawings were sufficient in this regard (and it is believed that they would not be insofar as one skilled in the art would not interpret the drawings literally) there would still be no anticipation because of the lack of a current injection ridge. Absent the current injection ridge, there would be little reason to have rounded corners connected to the substrate at a lower portion of the mesa structure. It is also not understood how the electrode 112 of the Okazaki et al patent forms a current injection ridge insofar as it is simply an electrode, and not a current injection ridge. This interpretation is particularly unclear insofar as claims 1 and 9 also recite a contact hole in a passivation layer for exposing an upper surface of the current injection ridge. An electrode would not be interpreted by one skilled in the art as forming a current injection ridge, particularly since it is a known term in the art with a known function that excludes its reading on a mere electrode.

Applicants continue to not understand the reference to the dimension of 0.5 to 3.3 μm in Figure 4b of the Okazaki et al patent. While the dimension is recognized as referring to a particular structure, albeit embedded in the mesa structure being relied upon, it does not correspond to any structure on the top of the mesa structure which could fairly be described as protruding from an upper surface of the mesa structure. It does not correspond to the dimensions of the electrode 112, for instance. Hence, applicants are still not clear as to what the Office is addressing, but the only thing that protrudes from the upper surface of the mesa structure is the electrode 112, which cannot be fairly described as a current injection ridge insofar as

one would not confuse an electrode with a current injection ridge which has a known definition in the art.

With respect to the Van Ruyven patent, the Office's comments that it includes forced distribution ridges is not understood because it doesn't show any structure projecting from the top of the mesa structure, with the possible exception of the electrode 112, which could not be properly interpreted as a current injection ridge, but even if it were, it would still not meet the recitations of claim 9 which additionally calls for forced distribution ridges. It could be that the Office is suggesting that the electrode 112 is a continuous form of a current injection ridge and forced distribution ridges, but that would be confusing insofar as ridges are discrete structures and one should not properly read at least three structures on a single planar electrode in this respect. Further clarification in this regard is desired.

Applicants also do not understand the Office's comments regarding the individual references insofar as the Van Ruyven patent and the Okazaki et al patent were cited as anticipatory references against claims 1 and 9 and claims 1-8, respectively.

With respect to the rejections of claims 9-16 over a combination of the Okazaki et al patent in view of the Witzigmann et al patent publication and the Tsukada et al patent, applicants note the following. Tsukada et al does not actually disclose the culmination of a current distribution ridge and force distribution ridges. It simply shows a narrow strip mesa formed by an electrical insulator layer 7 and an evaporated metal layer 6 deposited on the insulator layer 7. The ridge structure is incidental but most importantly, does not meet the recitations of a combination of a current injection ridge and forced distribution ridges formed on an upper portion of

the mesa structure and protruding from the upper surface of the mesa structure. In this instance, the incidental ridge type structures are the mesa structure and there are not three ridges but two, one of which is not a current injection ridge.

As for the passage at column 7, lines 28-34, this is in reference to the embodiment shown in Figure 6 which presents itself as a more or less flat surfaced structure because it has multiple mesa structures. However, that would still not meet the recitations of claim 9 which call for the current injection ridge and the force distribution ridge being formed on an upper portion of a mesa structure and protruding from an upper surface of the mesa structure. Again, these structures are the mesa structures therefore do not protrude from mesa structures.

As for the combination, applicants note that the Okazaki et al patent has a mesa structure so that the electrodes 112 and 111 can be on the same side, as opposed to opposite sides such as shown in Figure 6 of the Tsukada et al patent. Hence, the disclosure of Figure 6 of the Tsukada et al. patent would not necessarily translate and in fact would not seemingly translate to a structure having both electrodes on one side. Even if it did, however, the disclosure would be to include a second or third mesa structure presumably outside the area of electrode 111, rather than force distribution ridges formed on and projecting from an upper surface of the mesa structure.

Finally, with respect to the Witzigmann et al patent, the pads referred to in paragraph 0008 refer to the protective pads 406 which reside only on a non-active area of the junction surface 412 and protrude beyond the edge of the ridge structure, in order to enable mechanical protection during pick in place movements. As such, these pads cannot and are not shown as projecting from the mesa structure but are

very ancillary and much more macroscopic in dimension. Stated differently, even if one were to employ the disclosure of the Witzigmann et al patent in the Okazaki et al structure, it would result in protective pads being applied outside the area of the structure shown in the Okazaki et al patent to permit pick in place tools. The hypothetical combination, however, would not meet the recitation of a current injection ridge in forced distribution ridges formed on and projecting from an upper surface of a mesa structure.

Applicants note in passing the Examiner's comment that claims 1 and 9 are "unpatentable regardless of Okazaki et al's teachings" is noted. However, applicants have provided extensive comments as to why the Okazaki et al patent does not render the present claims unpatentable. These comments apply equally to the Van Ruyven patent in many respects.

In light of the foregoing, applicants respectfully request reconsideration and allowance of the above-captioned application. Should any residual issues exist, the Examiner is invited to contact the undersigned at the number listed below.

Respectfully submitted,

BUCHANAN INGERSOLL & ROONEY PC

Date: September 25, 2006 By: _____

Charles F. Wieland III
Registration No. 33096

P.O. Box 1404
Alexandria, VA 22313-1404
703 836 6620